# Complete Summary

## GUIDELINE TITLE

Chronic obstructive pulmonary disease (COPD).

## BIBLIOGRAPHIC SOURCE(S)

Finnish Medical Society Duodecim. Chronic obstructive pulmonary disease (COPD). In: EBM Guidelines. Evidence-Based Medicine [CD-ROM]. Helsinki, Finland: Duodecim Medical Publications Ltd.; 2005 Mar 2 [Various]. [37 references]

## GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Finnish Medical Society Duodecim. Chronic obstructive pulmonary disease (COPD). In: EBM Guidelines. Evidence-Based Medicine [CD-ROM]. Helsinki, Finland: Duodecim Medical Publications Ltd.; 2004 Jun 28 [various].

## ** REGULATORY ALERT **

## FDA WARNING/REGULATORY ALERT

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

On November 18, 2005, the U.S. Food and Drug Administration (FDA) notified manufacturers of Advair Diskus, Foradil Aerolizer, and Serevent Diskus to update their existing product labels with new warnings and a Medication Guide for patients to alert health care professionals and patients that these medicines may increase the chance of severe asthma episodes, and death when those episodes occur. All of these products contain long-acting beta2-adrenergic agonists (LABA). Even though LABAs decrease the frequency of asthma episodes, these medicines may make asthma episodes more severe when they occur. A Medication Guide with information about these risks will be given to patients when a prescription for a LABA is filled or refilled. See the FDA Web site for more information.

## COMPLETE SUMMARY CONTENT

## SCOPE

### DISEASE/CONDITION(S)

Chronic obstructive pulmonary disease (COPD)

### GUIDELINE CATEGORY

Diagnosis
Management
Treatment

### CLINICAL SPECIALTY

Family Practice
Internal Medicine
Pulmonary Medicine

### INTENDED USERS

Health Care Providers
Physicians

### GUIDELINE OBJECTIVE(S)

Evidence-Based Medicine Guidelines collect, summarize, and update the core clinical knowledge essential in general practice. The guidelines also describe the scientific evidence underlying the given recommendations.

### TARGET POPULATION

- Adults with chronic obstructive pulmonary disease (COPD)
- Adults requiring evaluation for possible chronic obstructive pulmonary disease

### INTERVENTIONS AND PRACTICES CONSIDERED

Diagnosis

1. Physical examination and assessment of signs and symptoms
2. Spirometry in combination with active promotion of smoking cessation
3. Assessment of forced expiratory volume in one second/forced vital capacity ($FEV_1$/FVC)

4. Test with a bronchodilating drug and subsequent assessment of response (as measured by spirometry and bronchodilator dose or peak expiratory flow [PEF] follow-up)
5. Evaluation of the effectiveness of anti-inflammatory treatment with a trial of steroids (oral prednisolone or inhaled steroid)
6. Assessment of diffusion capacity
7. Blood gas analysis
8. Chest radiograph

### Treatment

1. Cessation of smoking
2. Drug therapy
    - Bronchodilating medication (Inhaled short acting or long acting anticholinergic drug; inhaled beta-sympathomimetic; oral, long-acting theophylline)
    - Anti-inflammatory medication
3. Nonpharmacologic measures to promote mucous excretion
4. Treatment of acute exacerbation (oxygen by nasal catheter or by venturi mask; noninvasive positive pressure ventilation; an inhaled sympathomimetic, possibly in combination with an inhaled ipratropium bromide, methyl prednisolone or oral corticosteroids
5. Treatment of acute infection with antimicrobials
6. Exercise
7. Vaccinations (influenza, pneumococcal, haemophilus influenzae)
8. Oxygen therapy at home
9. Action plans that include the self-initiation of antibiotics or steroids

Note: Guideline developers considered, but did not recommend the following interventions: theophylline infusion, combined corticosteroid and long acting beta-agonist, nutritional support, cardioselective beta-blockers for short-term reduction in airway function, vibration for clearing bronchial secretions, and nocturnal positive pressure ventilation.

### MAJOR OUTCOMES CONSIDERED

- Symptom relief
- Exercise capacity
- Lung function (as measured by spirometry)
- Morbidity and mortality
- Quality of life
- Frequency and severity of exacerbations

## METHODOLOGY

### METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Hand-searches of Published Literature (Secondary Sources)
Searches of Electronic Databases

### DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The evidence reviewed was collected from the Cochrane database of systematic reviews and the Database of Abstracts of Reviews of Effectiveness (DARE). In addition, the Cochrane Library and medical journals were searched specifically for original publications.

## NUMBER OF SOURCE DOCUMENTS

Not stated

## METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

## RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Levels of Evidence

A. Strong research-based evidence. Multiple relevant, high-quality scientific studies with homogeneous results.
B. Moderate research-based evidence. At least one relevant, high-quality study or multiple adequate studies.
C. Limited research-based evidence. At least one adequate scientific study.
D. No research-based evidence. Expert panel evaluation of other information.

## METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review

## DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

## METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

## RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

## COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

## METHOD OF GUIDELINE VALIDATION

Peer Review

## DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Not stated

# RECOMMENDATIONS

## MAJOR RECOMMENDATIONS

The levels of evidence [A-D] supporting the recommendations are defined at the end of the "Major Recommendations" field.

### Basic Rules

- Consider the diagnosis of chronic obstructive pulmonary disease (COPD) in any smoker who has the following: symptoms of cough, sputum production, or dyspnoea.
- The diagnosis should be made early by spirometry. By this time, at the latest, the patient should give up smoking. (See the Finnish Medical Society Duodecim guideline "Smoking Cessation.").
- According to international criteria (Global Initiative for Chronic Obstructive Lung Disease [GOLD]), forced expiratory volume in one second/forced vital capacity ($FEV_1$/FVC) is below 0.7 in COPD.
- Most important differential diagnostic problem is asthma. Also many asthmatics smoke.

### Definitions

- Chronic bronchitis: sputum at least for 3 months in 2 consecutive years.
- Pulmonary emphysema (is a pathologic anatomic diagnosis): terminal air spaces widen and alveolar walls rupture.
- Chronic obstructive pulmonary disease (COPD): the patient has chronic progressive airway obstruction, with no significant response to treatment. Other typical findings include chronic bronchitis and emphysema in varying grades depending on the patient.

### Aetiology

- Most COPD patients (>95%) are smokers. Half of those who smoke have symptoms of chronic bronchitis. A slowly aggravating airway obstruction is detected in about 25% of smokers.
- Deficiency of alpha-1-antitrypsin is a rare cause of emphysema in young patients.

### Symptoms

- Cough and sputum excretion are the most common symptoms.
- Patients with progressive disease suffer from slowly increasing dyspnoea during exercise.
- The symptoms are aggravated by respiratory infection.

## Signs

- Most patients seek for a doctor late, when the disease is already moderate to severe. In mild disease auscultation may be normal and no auscultatory signs for obstruction can be detected.
- The following symptoms indicate severe COPD; their absence does not exclude the existence of mild COPD:
    - Because of airway obstruction, wheezing rattles may be heard at the end of forced expiration.
    - The patient with advanced emphysema has a barrel-chested appearance, on auscultation silent respiratory sounds are heard and on percussion the sound is hypersonor.
    - Cyanosis is associated with hypoxaemia.

## Complications

- Acute
    - Repeated and prolonged lower respiratory infections
    - Acute respiratory failure
    - Pneumothorax (disruption of emphysematic bullae)
- Chronic
    - Chronic respiratory failure, cardiopulmonary disease

## Diagnosis

- Early diagnosis by spirometry in combination with active promotion of smoking cessation is pursued.
- Test with a bronchodilating drug (See the Finnish Medical Society Duodecim guideline "Pulmonary Function Tests.").
    - The response to a bronchodilating drug is measured either by spirometry that is combined with a dose of a broncholytic drug (e.g., inhaled salbutamol 400 micrograms) or by PEF-measurements performed before and after the administration of the drug. In COPD, there is no response (cf. asthma).
- The effectiveness of anti-inflammatory treatment is evaluated with a trial of steroids.
    - Oral prednisolone, initially 30 to 40 mg/day (if necessary, give protection against ulcers, e.g. a proton pump inhibitor [PPI]), or inhaled steroid (e.g., budesonide 400 to 800 micrograms twice daily). In oral administration the duration is 2 weeks, with an inhaled steroid 6 weeks.
    - An objective response (PEF increase >20% and/or $FEV_1$ increase >12% and at least 200 mL) is indicative of asthma.
- Diffusion capacity
    - Decreased in COPD
- Blood gas analysis
    - In late stages of COPD arterial blood oxygen partial pressure ($pO_2$) decreases and carbon dioxide partial pressure ($pCO_2$) may increase
- Chest x-ray is of limited value in COPD diagnosis
- According to the international criteria, the threshold value for the diagnosis of mild COPD is $FEV_1$/FVC <70% after the bronchodilating test, when FEV% is >80%.

## Treatment

### Cessation of Smoking

- The most essential factor regarding the prognosis
- Does not normalize lung function, but the progressive deterioration of $FEV_1$ slows down and proceeds at the same pace as in non-smokers.
- According to present knowledge, there is no drug therapy available that could delay the deterioration of lung function if the patient continues smoking. Drugs are only useful for relieving subjective symptoms and in the treatment of acute exacerbations.
- See the Finnish Medical Society Duodecim guideline "Smoking Cessation."

### Basic Rules of Drug Therapy

- Mild disease
    - Asymptomatic patients
        - No drug therapy
    - Patients with occasional symptoms (generally $FEV_1$ >50% predicted)
        - Anticholinergics or short-acting beta-2-agonists according to clinical response
        - Trial of steroids if asthma is suspected
- Continuous symptoms ($FEV_1$ generally <50% predicted)
    - Anticholinergics or short-acting beta-2-agonists (combined) according to clinical response or
    - Long acting anticholinergics or beta-2-agonists, or their combination
    - In selected cases inhaled glucocorticoid if frequent exacerbations
    - Trial of theophylline if symptoms persist (Ram et al., "Oral theophylline," 2002) [A]
    - Surgery (bullectomy, lung transplantation, lung volume reduction) can be recommended only to a small subset of the patients after careful evaluation

### Bronchodilating Medication

- Inhaled short acting (ipratropium [McCrory & Brown, 2002] [B] oxitropium bromide) or long acting (tiotropium [Barr et al., 2005] [A]) anticholinergic drug.
    - First line treatment
    - The dose must be high enough; administration 4 to 6 times daily with the short acting drug, once a day with the long acting tiotropium.
- Inhaled beta-sympathomimetic (salbutamol, terbutaline, fenoterol) (Sestini et al., 2002) [A]
    - May be combined with an anticholinergic drug
    - Long-acting beta-sympathomimetics (formoterol, salmeterol [Appleton et al., 2001] [B]) may improve quality of life and reduce symptoms.
- Oral, long-acting theophylline (Ram et al., "Oral theophylline," 2002) [A]
    - Adverse effects (central nervous system, gastrointestinal symptoms) are common (follow-up of serum concentrations is necessary).
    - Arrhythmias and convulsions are signs of toxicity.
    - Keep in mind various interactions with other drugs (e.g., antibiotics).

### Anti-inflammatory Medication

Inhaled steroids are only prescribed for patients with frequent exacerbations (van Grunsven et al., 1999) [B].

### Treatment of Mucous Excretion

- If production of mucus is a problem, the patient is recommended to perform regular self-initiated mucus drainage sessions at home by exhaling air through a straw into a water-filled bottle, after which the expectorated mucus is coughed up (Jones & Rowe, 2000) [D].
- Mucolytic agents should be used only temporarily (Poole & Black, 2003) [B].

### Treatment of Acute Exacerbation

- Oxygen by nasal catheter or by venturi mask. Caution should be exercised when dosing (if the result of an arterial blood gas analysis is not available, the concentration of mask oxygen should not exceed 28%, or nasal catheter flow should not exceed 2 L/min in patients above the age of 50 years).
- Non-invasive positive pressure ventilation using a mask improves recovery in severe acute exacerbation of COPD (Ram et al., 2004; Keenan et al., 2003) [A]
- An inhaled sympathomimetic (salbutamol 2.5-5 mg or terbutaline 5-10 mg) by a dosing device or a spray. Inhaled ipratropium bromide 0.5 mg can be added to it.
- There is no evidence of a significant effect of theophylline infusion (Barr, Rowe, & Camargo, 2003) [C] and its usage is not recommended. It may sometimes be used at a dose of 0.5 mg/kg/hour if response to other treatments is poor. Serum theophylline concentration should be monitored if possible.
- Methyl prednisolone 0.5 mg/kg every 6 hours is probably beneficial. Oral corticosteroids (prednisolone 30-40 mg/day) are used empirically for 7 to 14 days.

### Acute Infection

- Antimicrobial treatment in an exacerbation of COPD is controversial (McCrory & Brown, 2001) (Saint et al., 1995; Staykova et al., 2001) [B]. Factors that indicate starting antimicrobial treatment include:
    - Increased dyspnoea
    - Increased sputum
    - Purulent sputum
- If the patient exhibits two of the three symptoms listed above, an antimicrobial drug is usually indicated (Saint et al., 1995, Staykova et al., 2001) [B].
- Alternatives in antimicrobial treatment:
    - Amoxicillin 500 mg three times daily for 10 days
    - Doxycycline 150 mg once daily for 10 days
    - Sulfa-trimethoprim, dose of trimethoprim 160 mg twice daily for 10 days.
- Antibiotics do not belong to the basic maintenance therapy of COPD.

### Improvement of Exercise Capacity

- Long-lasting, regular, and moderate exercise (Lacasse et al., 1996; Cambach et al., 1999) [A]

### Vaccinations

- Influenza vaccination should be given yearly to all patients with clearly decreased ventilatory function (Poole et al., 2006) [C].
- Pneumococcal vaccination is recommended.
- Haemophilus influenzae vaccination may also be beneficial (Foxwell, Cripps, & Dear, 2003) [B].

## Oxygen Therapy at Home

### Basics

- Oxygen therapy at home can be used to prevent elevation of pulmonary arterial pressure in advanced COPD and to extend the life of the patient.
- The effect of oxygen therapy on symptoms (e.g., shortness of breath) is quite limited.
- Oxygen therapy at home is meant only for patients with chronic hypoxaemia (i.e., arterial desaturation).
- Treatment decisions should be made after critical consideration.
- When initiating oxygen therapy at home, appropriate monitoring of treatment must be ensured. Treatment decisions and implementation of treatment should be the responsibility of the local pulmonary clinic.

### Initiation Criteria for Oxygen Therapy

- Chronic, advanced pulmonary disease ($FEV_1$ <1.5 L)
- The partial pressure of oxygen in arterial blood, measured with the patient in stable phase of the disease breathing room air is <7.3 kPa in two samples taken with an interval of at least three weeks.
- Partial pressure of oxygen can also be 7.3 to 8.0 kPa if one of the following criteria is involved:
    - Signs of increased pulmonary arterial pressure (e.g., oedema)
    - Secondary polycythaemia (haematocrit >55)
    - Significant nocturnal hypoxaemia established by oximetry and reversible by oxygen therapy and not caused by concomitant sleep apnoea syndrome
    - Significant neuropsychological symptoms reversible by oxygen therapy
- Oxygen therapy gives the desired response ($PaO_2$ >8.0 kPa) without unfavourable increase in the partial pressure of carbon dioxide in arterial blood.
- The patient does not smoke and is sufficiently cooperative.

### Implementation of Treatment

- Oxygen therapy at home is implemented in most cases using an electric oxygen concentrator. The oxygen concentrator eliminates nitrogen from room air and provides the patient with over 90%-proof oxygen.
- Portable liquid oxygen is suitable for a minority of patients. Primarily these are patients who are in the working life and/or who are motivated for rehabilitation through physical exercise.
- All oxygen therapy necessitates good cooperation by the patient and willingness for long-term cooperation with the treating unit.
- Home calls made by a rehabilitation instructor are an essential part of the monitoring of patients receiving oxygen therapy at home.

Related Evidence

- Anti-cholinergic bronchodilatators appear to have similar efficacy as beta-2-sympathomimetic agents for acute exacerbations of chronic obstructive pulmonary disease (McCrory & Brown, 2002) [B].
- Combined corticosteroid and long acting beta-agonist (budesonide/formoterol or fluticasone/salmeterol) in one inhaler are modestly effective in reducing exacerbations and improving quality of life when compared to placebo, but there is little evidence of enhanced effectiveness compared to either of the components alone (Nannini, Lasserson, & Poole, 2004) [A].
- There is little evidence on the effectiveness of ambulatory domiciliary oxygen therapy on exercise capacity in patients with COPD (Ram & Wedzicha, 2002) [C].
- Noninvasive ventilation reduces mortality and need for intubation in severe exacerbations of COPD (Keenan & Brake, 1998) [A].
- In patients with stable COPD, pressurized metered-dose inhalers (pMDIs) produce similar outcomes to dry powder devices for delivering beta-2 agonist (Ram et al., "Pressurised," 2002) [C].
- Nutritional support has no significant effect on anthropometric measures, lung function, or exercise capacity in patients with stable COPD (Ferreira et al., 2005) [B].
- Cardioselective beta-blockers do not produce significant short-term reduction in airway function when given to patients with COPD (Salpeter, Ormiston, & Salpeter, 2005) [B].
- There is no clear evidence supporting vibration for clearing bronchial secretions (Thomas et al., 1995) [D].
- Stapling is more effective than laser resection for lung volume reduction in diffuse emphysema, but there is no evidence from randomised trials comparing surgery with optimal conservative treatment (Hensley et al., 1999) [B].
- Nocturnal positive pressure ventilation appears not to improve the condition of patients with COPD (Wijkstra et al., 2002.) [B].
- Hospital at home with support from specialized nurses is a safe alternative for about one in four selected patients with acute exacerbation of COPD (Ram et al., 2003) [A].
- Oral steroids appear to improve lung function and symptoms more than placebo in stable COPD, but not all people benefit equally. Long-term use does not slow the decline in lung function and there is an increased risk of side-effects (Walters, Walters, & Wood-Baker, 2005) [B].

- Action plans may aid people with COPD in recognising and reacting appropriately to an exacerbation of their symptoms via the self-initiation of antibiotics or steroids (Turnock, et al., 2005) [C].

Definitions:

Levels of Evidence

A. Strong research-based evidence. Multiple relevant, high-quality scientific studies with homogeneous results.
B. Moderate research-based evidence. At least one relevant, high-quality study or multiple adequate studies.
C. Limited research-based evidence. At least one adequate scientific study.
D. No research-based evidence. Expert panel evaluation of other information.

## CLINICAL ALGORITHM(S)

None provided

# EVIDENCE SUPPORTING THE RECOMMENDATIONS

## REFERENCES SUPPORTING THE RECOMMENDATIONS

References open in a new window

## TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

Concise summaries of scientific evidence attached to the individual guidelines are the unique feature of the Evidence-Based Medicine Guidelines. The evidence summaries allow the clinician to judge how well-founded the treatment recommendations are. The type of supporting evidence is identified and graded for select recommendations (see the "Major Recommendations" field).

# BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

## POTENTIAL BENEFITS

Appropriate management and treatment of chronic obstructive pulmonary disease (COPD) may help relieve patient symptoms, improve exercise capacity, improve lung function, reduce morbidity and mortality, improve quality of life, and reduce frequency and severity of exacerbations.

## POTENTIAL HARMS

Adverse Effects of Medications

- Common adverse effects of oral, long-acting theophylline include central nervous system and gastrointestinal symptoms. Arrhythmias and convulsions are signs of toxicity.

- Long-term use of oral steroids does not slow the decline in lung function and there is an increased risk of side-effects.

## IMPLEMENTATION OF THE GUIDELINE

### DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

## INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

### IOM CARE NEED

Getting Better
Living with Illness

### IOM DOMAIN

Effectiveness
Patient-centeredness

## IDENTIFYING INFORMATION AND AVAILABILITY

### BIBLIOGRAPHIC SOURCE(S)

Finnish Medical Society Duodecim. Chronic obstructive pulmonary disease (COPD). In: EBM Guidelines. Evidence-Based Medicine [CD-ROM]. Helsinki, Finland: Duodecim Medical Publications Ltd.; 2005 Mar 2 [Various]. [37 references]

### ADAPTATION

Not applicable: The guideline was not adapted from another source.

### DATE RELEASED

2002 Apr 27 (revised 2005 Mar 2)

### GUIDELINE DEVELOPER(S)

Finnish Medical Society Duodecim - Professional Association

### SOURCE(S) OF FUNDING

Finnish Medical Society Duodecim

### GUIDELINE COMMITTEE

Editorial Team of EBM Guidelines

## COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Primary Author: Vuokko Kinnula

## FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

## GUIDELINE STATUS

This is the current release of the guideline.

This guideline updates a previous version: Finnish Medical Society Duodecim. Chronic obstructive pulmonary disease (COPD). In: EBM Guidelines. Evidence-Based Medicine [CD-ROM]. Helsinki, Finland: Duodecim Medical Publications Ltd.; 2004 Jun 28 [various].

## GUIDELINE AVAILABILITY

This guideline is included in a CD-ROM titled "EBM Guidelines. Evidence-Based Medicine" available from Duodecim Medical Publications, Ltd, PO Box 713, 00101 Helsinki, Finland; e-mail: info@ebm-guidelines.com; Web site: www.ebm-guidelines.com.

## AVAILABILITY OF COMPANION DOCUMENTS

None available

## PATIENT RESOURCES

None available

## NGC STATUS

This summary was completed by ECRI on December 17, 2002. The information was verified by the guideline developer as of February 7, 2003. This NGC summary was updated by ECRI on October 1, 2004. This summary was updated by ECRI on December 5, 2005 following the U.S. Food and Drug Administration (FDA) advisory on long-acting beta2-adrenergic agonists (LABA).This summary was updated by ECRI on March 14, 2006.

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Date Modified: 10/9/2006